

REMARKS

Applicant hereby responds to the Office Action dated February 20, 2007. Claims 1 to 39 are presented for examination. Claims 1, 22, and 34, are independent. Applicant respectfully submits that the claims as previously filed are in condition for allowance and requests reconsideration and further examination in view of the following.

A. Election/Restrictions under 37 C.F.R. 1.144.

Claims 40 to 54 are cancelled without prejudice or disclaimer as required by 37 C.F.R. 1.144.

B. Claim Rejections.

Claims 1, 6-19 and 22-38 have been rejected under 35 U.S.C. 102(a) over 6,371,723B1 to *Grant* et al. ("*Grant*"). Claims 1 and 7-13 have been rejected under 35 U.S.C. 102(b) over 6,168,753B1 to *Morando* ("*Morando*"). Claims 1-39 have been rejected as being unpatentable under 35 U.S.C. 103(a) in view of *Grant* and *Morando*. Applicant submits that neither of the prior art references of record, alone or in combination, teaches the claimed invention.

Applicant acknowledges that it was known to place a ceramic sleeve on a graphite component for use in a molten metal bath before Applicant's invention. Such a device is described in this Application at, among other places, paragraphs [14] and [15]. The prior art devices are formed by applying cement on a graphite component and then sliding the ceramic sleeve over the component and allowing the cement to dry. Application ¶ [14]. This can lead to voids which can cause component failure. Application ¶¶ [14] and [15].

The present invention differs from the prior art in that, among other things, the protective outer coating is first placed over the graphite component thereby defining a space between the protective outer coating and the component. Claim 1; Application ¶ [16]. Cement is then injected into the space between the protective, outer coating and the graphite component. Id.; claim 1. Using this method, it is less likely that there will be gaps, which leads to longer component life. Application ¶ [16]. The claims as now amended further describe the invention as including one or more passages in the non-protected component (i.e., the component over which the protective outer coating is placed), such as a graphite shaft, or one or more openings in the protective coating, such as a ceramic sleeve. At least some of the uncured cement is injected through the one or more of the passages and/or the one or more openings. The prior art references lack these claimed structures and do not yield the same product.

When reviewing product-by-process claims, the structure implied by the process should be considered when assessing the patentability of product-by-process claims over the prior art . . . especially where the manufacturing process steps would be expected to import distinctive structural characteristics. MPEP § 2113. Here, Applicant's amended claims define a structure that is not disclosed in the prior art. **For example, the passage(s) and/or opening(s) are not described in the prior art and allow for uncured cement to be injected into essentially the entire space between the unprotected component and the protective coating, thus alleviating the occurrence of voids.**

Grant teaches a shaft system 100 that includes a shaft coupler 104 and an outer sleeve shaft 103. Col. 5, ll. 38-41. The shaft coupler is placed over a graphite shaft and the shaft sleeve is placed over the shaft coupler. Col. 6, ll. 19-29. Cement is then applied to approximately ½ inch of each end of the shaft and the combined shaft, shaft coupler and shaft sleeve are heated to approximately 800°F. Col. 6, ll. 29-34. This causes the shaft coupler to expand and secure the shaft sleeve to the shaft. Col. 6, ll. 34-36. The resulting product would not have cement substantially filling the gap between the graphite component and the outer coating, but instead teaches cement only filling about a 1/2" high space between the two at one end of the shaft. Nor does *Grant* teach, among other things, (a) a non-protected component, such as a graphite shaft, that has one or more passages through which uncured cement can be injected, and/or (b) a protective coating, such as a ceramic sleeve, that has one or more openings through which uncured cement can be injected.

Morando teaches a graphite leg surrounded by a ceramic sleeve 34, which is adhered to the graphite leg utilizing cement. Col. 2, ll. 33-39; ll. 49-58. *Morando* also does not teach a product made by the process of the current invention and is presumed to be made utilizing the known process of first applying uncured cement to the graphite component and then sliding on the ceramic sleeve. *Morando* does not teach, among other things, (a) a non-protected component, such as a graphite shaft, that has one or more passages through which uncured cement can be injected, and/or (b) a protective coating, such as a ceramic sleeve, that has one or more openings through which uncured cement can be injected.

In maintaining the rejection of independent claims 1, 22, and 34 in the present Office Action, the Examiner responds to Applicant's assertion that neither *Grant* nor *Morando* teach one or more channels in the non-coated component or one or more openings in the protective

coating by stating that in both *Grant* and *Morando*, “***the space between the two components forms a channel.***” Office Action, Response to Arguments Section. The space between the shaft coupler 104 and an outer sleeve shaft 103 in *Grant* is not a channel in either component, rather it is a space between the two components. More profusely, it is the exact space Applicant’s invention substantially fills with cement to alleviate the voids that are prevalent in the prior art method of sliding on the outer sleeve after applying cement to the unprotected component.

Likewise, the space between the graphite leg and ceramic sleeve 34 in *Morando* is also not a channel or opening in either component. Applicant respectfully submits that all claim limitations are significant and must be given weight and effect in relation to the patentability of the claim. A space formed between the components in *Grant* and *Morando* is simply not the same structure as the claimed channel in the non-coated component or opening in the protective coating set forth in independent claims 1, 22, and 34.

The Examiner additionally maintains the rejection of independent claims 1, 22, and 34 based on the assertion that “***both of Grant (120 in Fig. 3 for example) and Morando (74 in figure 4) show channels openings or passages through which cement could, if desired be injected.***” Office Action, Response to Arguments Section. With regards to the cavity 120 shown in Figure 3 of *Grant*, Applicant respectfully submits that cavity 120 is not a feature of the base shaft 101 “through which cement could be injected,” rather it illustrates the negative result of an air pocket on base Shaft 101: “FIG. 3 illustrates how the air pocket 111 shown in FIG. 2 has allowed the oxidation or corrosion of base shaft 101. ***The cavity120 in base shaft 101 will lead to failure or the need to replace the base shaft.***” Col. 5, ll. 17-20. As such, the cavity 120 is not built into the base shaft 101 and therefore could not be used to inject cement. *Grant* thus does not teach injecting cement through one or more channels in a non-coated component and/or one or more openings in a protective coating. As such, Applicant respectfully submits that *Grant* does not teach each and every limitation in independent claims 1, 22, and 34, and therefore cannot anticipate or render obvious these claims or any claim dependent thereon.

Applicant respectfully submits that the radial channel 74 in Figure 4 of *Morando* is likewise not a channel or passage through which cement could be injected. First, Figure 4 of *Morando* relates to Figure 3 of *Morando*. Col. 3, ll. 14 and 37. In this embodiment, a graphite leg 70 is housed within a ceramic sleeve 62. The graphite leg 70 is formed with an external helical groove 68 that is connected to channel 74, which in turn connects to conduit 30 to allow

nitrogen gas to form a “helical shield” around the graphite leg 70 through the helical groove 70 during operation of the pump. Col. 3, ll. 14-44. Applicants respectfully submits that the contention that channel 74 could be used to inject cement is incorrect for at least three reasons. First, *Morando* simply does not teach injecting cement through channel 74. On the contrary, the channel 74 and corresponding helical groove 68 are only described as being used for conducting nitrogen gas, not for injecting refractory cement. Second, injecting uncured cement through channel 74 and helical groove 68 would render the embodiment depicted in Figures 3 and 4 of *Morando* inoperable. The cement would block the helical groove 68 and channel 74, preventing the nitrogen gas from flowing and forming the “helical shield” described by *Morando*. Finally, the injection of cement through a structure such as the channel 74 and helical groove 68 would require an incredible amount of pressure. Such extreme pressure could rupture the Kawool gasket 64 forming the seal between the graphite leg 70 and ceramic sleeve 62, which is contrary to *Morando*’s purpose.

Thus, neither *Grant* nor *Morando*, individually or in combination, teach (a) a non-protected component, such as a graphite shaft, that has one or more passages through which uncured cement can be injected and/or (b) a protective coating, such as a ceramic sleeve, that has one or more openings through which uncured cement can be injected, and as such does not anticipate any of independent claims 1, 22, and 34. Applicant therefore respectfully submits that the claims as previously filed are in condition for allowance and respectfully requests reconsideration and further examination in view of the foregoing.


CONCLUSION

Reconsideration is respectfully requested. Applicant believes the case is in condition for allowance and respectfully requests withdrawal of the objections and rejections and allowance of the pending claims.

Applicant hereby petitions for any extension of time which may be required to maintain the pendency of this case, and any required fee, except for the Issue Fee, for such extension is to be charged to **Deposit Account No. 19-3878**. The Examiner is invited to telephone the undersigned at the telephone number listed below if it would in any way advance prosecution of this case.

Respectfully submitted,

8/17/07
Date

By 
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